Guide to Range Condition and Stocking Rates for Alberta Grasslands 1988

Alberta
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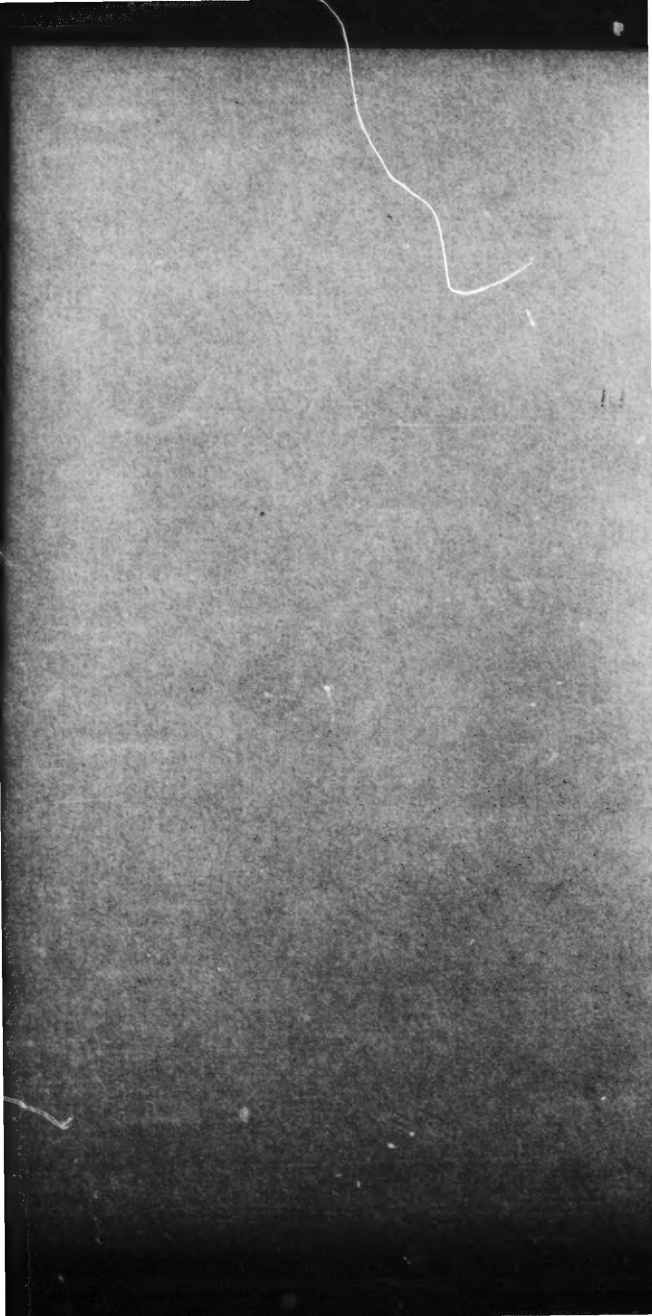

Guide to Range Condition and Stocking Rates for Alberta Grasslands 1988

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INTRODUCTION

Range management is defined as **The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resources.**

The principles of range management are:

- Balance the number of animals with the available forage supply;
- Obtain a uniform distribution of animals over the range;
- Alternate periods of grazing and rest to manage and maintain the vegetation;
- Use the kinds of livestock most suited to the forage supply and the objectives of management.

The principles of range management are based, in turn, upon two fundamental ecological principles:

- Physical factors, plants, and animals function as a unit and any change in one factor, such as that caused by fire or grazing, changes the whole complex; and
- Vegetational changes are natural phenomena, which follow certain patterns.

This publication is concerned primarily with ecological principles that affect range management. Successful range management is applied plant ecology. Applying ecological principles to range is dependent on the understanding of a few simple natural laws.

Soil and vegetation develop together throughout time under the climate that prevails. The vegetative community that develops on a specific soil under a specific climate is

called the **climax** community. This composition of plants is relatively stable, is capable of perpetuating itself, and fully utilizes the available moisture and nutrients from the soil and air, and radiant energy from the sun. Climax or near-pristine vegetation is a tangible benchmark that can be used to determine the ecological status or condition of the native vegetation.

There are four natural laws that help bring about an understanding of range ecology[1] and an appreciation of climax vegetation.

The first natural law is: **If we keep down the shoot, we kill the root!** Green leaves manufacture all the food from which roots grow. If too much of the leaves and stems are repeatedly grazed during the growing season, the root is starved and shortened. Its ability to reach moisture and nutrients is reduced. Eventually the plant will die.

The second natural law is: **Nature abhors a vacuum**. As nature does not like empty space it tries to keep the soil covered with vegetation as long as any soil is left. If grazing animals do not allow the taller, more productive grasses and more palatable forbs and shrubs to grow, then the unpalatable plants and grasses too short to graze will fill the void.

The third natural law is: **Nature is always trying to put back the kind of vegetation that grew on a particular site in the first place**. This is called the natural law of secondary plant succession. The changes in vegetation, if unmolested, proceed until there is a combination of plants that fit the soil and climate so perfectly that no other kind of plants can move in. That kind of vegetation is called climax. The climax vegetation in a grassland climate will be primarily a com-

[1]Dyksterhuis, E.J. 1951. Use of ecology on rangeland. J. Range Manage. 4:319-322.

bination of grasses, forbs and shrubs. Natural plant succession will increase the vigor and abundance of the better, high-producing native plants on ranges in fair or poor range condition if the range is given periodic rests. In some situations, the change will be quite rapid; in others, extremely slow.

The fourth and last law is: **The principal factor limiting growth in grassland climates is water supply**. On good to excellent condition ranges, more water is stored in the soil than on bare ground where most of the moisture that falls runs off. By keeping the soil covered with vegetation or a mulch of old growth most of the moisture will soak in the soil and less moisture will run off or evaporate. As the majority of Alberta rangelands are in a relatively low precipitation zone, it is of utmost importance to take full advantage of the moisture that falls naturally.

Details are given in this Guide on the method for classifying range condition on the various range sites and for estimating stocking rates. The Guide is intended for use only on rangeland representing natural grasslands; however, stocking rates for seeded pastures are included as they contribute towards carrying capacity.

RANGE SITES

Rangelands are areas on which the native vegetation is suitable for grazing. On the prairies, this vegetation consists of native grasses, forbs, and shrubs. This plant community developed and matured under natural conditions and is the original or climax vegetation of the area.

Each distinct kind of rangeland constitutes a range site, which has a certain potential for producing range plants.[2] Each site has its own environment, which produces a distinctive plant community. A range site retains its capacity to reproduce the original or climax plant community as long as the environment remains unchanged. Once the relationship between the community and its environment is understood, the nature of the climax community can be inferred from a knowledge of the environment even when the community is destroyed or changed by severe disturbance.

Many disturbances, for example, grazing, drought, fire, or tillage, may change or destroy the vegetation of a site. A slight disturbance may not change the potential of the range site. A severe disturbance with prolonged erosion, reduced fertility, and changed soil and water table conditions will seriously affect the potential of the site.

Vegetation alone cannot be depended upon to identify range sites. The more the site has been disturbed, the greater will be the change in the original vegetation. When the original vegetation is absent, other features of the area must be used to identify the site. These are the kinds of soil, climate, and topography. These criteria must be consistently associated with the range site.

Different range sites can be recognized through differences in the kinds or amounts of plants that make up the climax plant community. Range sites are recognized because of differences in the total yield of similar plant communities. Range sites are also recognized if differences in soil or climate result in a significant difference in the potential plant community. Significant differences in the kind and amount of vegetation of a plant community may result from differ-

[2] Dyksterhuis, E.J. 1958. Range conservation based on sites and condition classes. J. Soil Water Conserv. 14:151-155.

ences in depth, texture, and salinity of the soil, from differences in topography, climate, and exposure; and from differences in water table levels.

A range site may be identified by means of one or all of the above factors, provided the effect of one or all is reflected in significant differences in composition or yield. Factors that may influence the distribution of grazing but have little effect on composition or yield are not used.

The detail necessary in mapping range sites is determined locally. Range sites that may influence the proper use and management of a pasture or range unit should be included. The smallest area that needs to be mapped will vary with the productivity of the site and its influence on the range unit. A complex of range sites, the separation of which would not be practical, is mapped as one range site. Range sites containing less than 40 acres can be included with a larger site; a larger site may have as much as 20 per cent of its area made up of smaller sites.

Range sites are named to assist in recognizing the important kinds of rangeland. Range site names are based on easily recognized permanent physical features such as the kind of soil, climate, and topography, or combinations of these features. Plant names are not used because vegetation changes. Combinations of a permanent physiographic feature and the kind of potential vegetation of the site are more descriptive.

Range Site Descriptions

Names and descriptions of range sites are listed below in order of natural productivity, considering air-dry weight of all herbage produced by all seed plants in ordinary years under climax plant cover.

1. Range sites that can produce more herbage than ordinary range uplands because of superior soil moisture availability.

   WL – Wet Lands: Marshy lands with subirrigation where seepage, ponding, etc., raise the water table to above the surface during a part of the growing season; too wet for cultivated crops but too dry for true aquatics.

   Sb – Subirrigated: Lands with the water table rarely above the surface during the growing season but subirrigated most of the growing season.

   Ov – Overflow: Areas regularly receiving more than normal soil moisture because of run-in or stream overflow, and areas with water-spreading systems.

   SL – Saline Lowland: Subirrigated and overflow lands receiving more than normal soil moisture, where salt or alkali accumulations, or both, are apparent and salt-tolerant plants occur over most of the area.

2. Range sites with no obvious soil or moisture limiting factors. The vegetation can make a normal response to climate.

   Sa – Sands: Deep, loose, fine sands and very fine sands; surface level to rolling; excepting compact, dark, nearly level loamy fine sands and loamy very fine sands (not loose medium or coarse sands).

   Sv – Savannah: Uplands with deep soils on which grass cover with isolated trees is normal (climax); common at margins of forest and grassland where soil moisture favors tree growth.

Sy – Sandy: All normal coarse to fine sandy loams (not true sands) plus dark, nearly level, loamy fine sands, and loamy very fine sands.

Lo – Loamy: All normal loams, silt loams, and silts.

Cy – Clayey: All normal, relatively pervious, sandy to silty clay loams and clays – normally granular.

3. Range sites with characteristics or topographic features that limit soil moisture-holding capacity or infiltration rates.

CS – Choppy Sandhills: Deep, loose, fine sands; surface very irregular, with no profile development (sand dunes).

Li – Limy: Eroded (truncated) or immature soils in which the lime layer occurs at the surface.

SwG – Shallow to Gravel: Shallow soils resting on clean gravelly or cobbly materials, usually in stream bottoms.

BlO – Blowouts: Areas where hard clays or other impervious materials lie close to or at the surface in shallow depressions that occupy 20 to 50 percent of the area (Solonetz).

TB – Thin Breaks: Mixed soils of various depths with hard rock or other resistant bed outcroppings at various levels on steep irregular slopes.

Gr – Gravel: Coarse-textured soils with more than 50 percent gravel and small stones underlain by loose sand and gravel.

SU – Saline Upland: Soils with salt or alkali accumulation, or both; salt-tolerant plants occupy a major part of the area.

BdL – Badlands: Nearly barren lands broken by drainages dry most of the year with intermingled grazeable areas too small to justify mapping separately.

RANGE CONDITION

Range condition is the present state of the vegetation compared with that of the climax or original vegetation for the range site. The purpose in classifying range condition is to measure any deterioration that has taken place in the plant community. It also provides a basis for predicting the degree of improvement that is possible under various management situations.

Changes in range condition are brought about mainly through prolonged, heavy grazing. A series of wet or dry years may also cause changes in range condition.

Range condition classes are relative. If a range site is described as being in **good condition**, the description is always relative to the kind and amount of native vegetation that the particular range site is capable of producing. A major departure from climax indicates a declining range condition. Range condition can be improved by allowing the proportion of climax species to increase. The management goal may stop short of full climax as those species are only used as the point from which condition classes are measured.

Plant density and vigor, erosion, and natural mulch are not used as criteria for determining range condition. Density varies so greatly by soils and plant species that it is unreliable. For example, cheatgrass or blue grama may provide a high ground cover on a poor condition range, or a shallow, gravel or saline range site in excellent condition may support

only a sparse plant population. Vigor ratings also are not satisfactory. Erosion and the lack of natural mulch are generally products of a decline in range condition. Therefore, changes in composition, based on weight of species, are used as the primary criteria for determining range condition.

In rare instances, the single factor of percent climax composition is not adequate to determine condition. This may occur where density has been lost rapidly without the usual occupation of bared areas by invading plants, such as Russian thistle, cheatgrass or other annuals or where the species composition is predominantly an increaser or invader plant. If this occurs, estimate current annual production and relate it to the potential production for the site. Reduce estimated stocking rate by the percent the actual yield is of potential.

Range Condition Classes

In the range condition classification, four classes are used to express the degree to which the composition of the present plant community has departed from that of the climax. These four condition classes, based on the percentage of climax vegetation present in the range site, are shown below.

Condition Class	Percent of Climax
Excellent	76 - 100%
Good	51 - 75%
Fair	26 - 50%
Poor	0 - 25%

To assist in determining the range condition class for a range site, the plant species are grouped as decreasers, increasers, or invaders, based primarily on response to grazing pressure by cattle.

Decreasers – Species that decrease in relative abundance under continued heavy use. They are palatable to grazing animals and are the dominant species in the climax. In calculating the range condition class, the total of such species present is tallied.

Increasers – Species that normally increase in relative abundance as the decreasers decline. They are commonly shorter, less productive species and are codominant in the potential plant community or climax. These species increase at first but may decrease later as grazing pressures continue. Only the amounts of increaser species that would be present in the climax are tallied.

Invaders – Species that are not components of the climax vegetation. They invade a site as the decreasers and increasers are reduced by grazing or other disturbances. They may be members of other climax plant communities or exotics. Invaders may be annuals, herbaceous perennials, or shrubs and have some or no grazing value. They are not tallied in determining the range condition class.

The relationship among decreasers, increasers, and invaders in range condition classes is shown in Fig. 1. The deviation from climax is divided into excellent, good, fair, and poor range condition classes. The total of decreasers, increasers, and invaders is always 100 percent, and is based upon weight of the current growth.

The range condition classes indicate how far the vegetation has changed from the climax or original cover. The lower the condition rating, the farther the range is from climax condition. The higher the rating, the closer the range is to climax. Range condition rating is based on weight of vegetation, therefore, knowledge of the vegetation and its reaction to grazing is very essential.

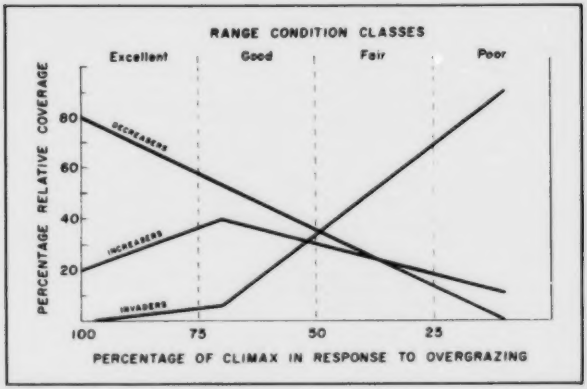


FIGURE 1. Relationship among decreasers, increasers, and invaders. (Dyksterhuis, E.J. 1949. Condition and management of range land based on quantitative ecology. J. Range Manage. 2:104-115.)

Excellent condition range will rate 76 to 100 percent. The largest part of the vegetation on most sites in excellent range condition is made up of decreaser plants. Good condition range rates 51 to 75 percent. Increasers and some decreasers make up a good part of the vegetation on range in good condition. Fair condition range will rate 26 to 50 percent. Few decreasers are found on range in fair condition. The increaser plants are weakened and invaders are often present. Poor condition range will rate 0 to 25 percent. Invaders make up most of the vegetation. Unpalatable forbs may become abundant.

STOCKING RATES

Recommended stocking rates are based on research results from grazing trials, on local experience, and on clipped plot yields. The recommended stocking rate for each range site and each condition class is a guide to grazing intensity and is not the equivalent of carrying capacity. The greater the difference between present and potential forage production of a site, the greater the difference will be between carrying capacity and recommended stocking rate. Ranges in poor condition will be stocked far under the carrying capacity of the zone to permit range improvement; those in excellent condition will be maintained. Prolonged drought, a series of wet years, winter use, and other factors may result in different stocking rates. Generally, grazing is managed to attain or maintain excellent or good range condition, rather than climax.

In planning the use of rangelands, the standard livestock unit is the **animal unit** (AU) defined as one mature (1,000 lb.) cow, with or without an unweaned calf at side, or equivalent, and is based upon the average daily forage consumption of 26 lb. dry matter per day. The animal unit may be adjusted to account for differences in size; for example, a 1,250 lb. cow should represent 1.25 AU. Stocking rates are often expressed in Animal Unit Months (AUMs) per acre. (When converting to the metric system, use the following factors: 1 lb. = 0.454 kg; 1 acre = 0.405 ha; and 1 inch = 25.4 mm).

Stocking rates can be affected by certain characteristics that may limit the use that can be made of the forage. Portions of the range that are rocky or are distant from water will be underused. Barren areas or areas covered by brush will reduce the amount of forage available for grazing. On ex-

cessively steep slopes, animals cannot or will not fully utilize all the forage. Under these conditions, the stocking rate must be reduced to avoid overuse of the more accessible parts of the range. Such reductions in stocking rates are known as utilization cuts. The utilization cut is applied on a percentage basis to reduce the number of AUMs per acre in the particular field.

However, no range of appreciable size can be uniformly utilized. Heavy use is inevitable around water holes, salt grounds, corrals, valley bottoms, and more accessible ridge tops. Because of this lack of uniformity in grazing, certain areas may have to be sacrificed or overused. Overuse of these sacrifice areas in valley bottoms and around water holes is justified providing the intermediate areas are properly used.

Table 1 can be used for making recommendations on stocking for normal soils of the various precipitation zones (Fig. 2). Precipitation zones are used to identify large, uniform range areas. In the grassland region, annual precipitation is greatest towards the foothills and near other hilly areas and is lowest on the plains where warm, southerly winds prevail during the summer. These precipitation patterns affect both the type of vegetation and the character of the soil.

Range sites with soil conditions other than those given for normal soils of the climate require upward or downward adjustments in the stocking rates shown in Table 1. The guide to departures from the basic stocking rate table by range sites is as follows:

Wet Land site: Triple the values for the 18- to 22-inch precipitation zone (p.z.).

TABLE 1. Stocking rate* table for normal soils of each precipitation zone

Average annual precipitation zone (inches)+	Stocking rates for various range condition classes (AUM/acre)			
	Excellent 76-100	Good 51-75	Fair 26-50	Poor** 0-25
22 - 26	1.20	1.00	0.80	0.60
18 - 22	0.80	0.65	0.50	0.35
14 - 18	0.50	0.40	0.30	0.20
10 - 14	0.30	0.25	0.20	0.15
6 - 10	0.20	0.15	0.10	0.05

* All rates may be much higher if grazing is limited to the season of complete dormancy.

+ See Figure 2

** Ranges in poor condition should ordinarily be given complete rest and may require a specialized grazing system to allow the proportion of climax species to increase.

Subirrigated site: Double the values for the 18- to 22-inch p.z.

Overflow site: Use values for next higher p.z.

Saline Lowland site: Use values for half to one p.z. higher.

Sands, Savannah, Sandy, Loamy, and Clayey sites: Use values for the p.z., that are given for normal soils.

Choppy Sandhills, Limy, Shallow to Gravel, and Blowout sites: Use values for half to one zone lower than the p.z.

Thin Breaks site: Use values for one to one and one-half zones lower than the p.z.

Gravel and Saline Upland sites: Use values for one and one-half to two zones lower than the p.z., but not less than half the value for the 6- to 10-inch p.z.

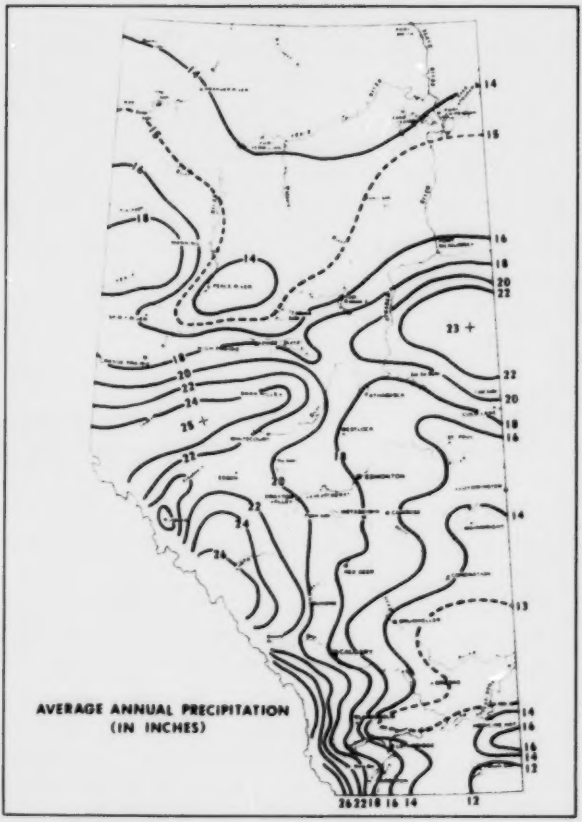


FIGURE 2. Average annual precipitation zones in Alberta (1 inch equals 25.4 mm).

Badland site: Use values for two to three zones lower than the p.z., but not less than half the values for the 6- to 10-inch p.z.

FIELD USE OF GUIDE

Field use of the Guide involves the following steps:

- Determine the precipitation zone for the area.
- Identify the range site by determining the kind, depth, texture, and drainage of the soil represented.
- Map the area to be surveyed and roughly outline the vegetation-type boundaries.
- Select locations at which composition estimates are to be taken.
- List decreaser, increaser, and invader species and estimate the percentage each contributes to total yield. Record only species contributing at least 5.0 percent of the total composition.
- The percentage of species composition can be checked by clipping and weighing the herbage of each of the species within selected plots, usually 1 sq.yd. or 1 m^2. Species composition can then be determined on the basis of the clipped air-dry herbage. Do not include club moss, lichens, or mosses in the composition estimates or clipped material.
- Total the percentages of the decreaser species and add the total of the maximum allowable percentages of the increaser species. The amount of each increaser species found in the original or climax vegetation on the various sites is given in the Alberta Guide Tables in Appendix I. None of the percentage composition made up by invaders is included in the combined total composition. The sum of percentage composition of the decreaser and allowable values of the increaser species is an expression of range condition denoting the percentage of

original or climax vegetation present on the range site. This value would categorize the range condition class as excellent, good, fair, or poor.

- Determine the stocking rate for each range site by referring to the Stocking Rate Table for Normal Soils (Table 1) and by making proper adjustments according to the guide to departures from normal soils.

An example of how initial stocking rates are determined is shown in Table 2. The percentage composition of existing species by weight of current growth on a Loamy site in the 10- to 14-inch p.z. has been estimated.

Reference to the Alberta Guide Table for the 10- to 14-inch precipitation zone (Appendix I, Part II) shows that needle-and-thread is a decreaser. Therefore, any amount present is part of the original vegetation and the 10 percent re-

TABLE 2. Example of estimated composition and calculated range condition

Species	Estimated composition (%)	Original or climax portion (%)
Needle-and-thread	10	10
Blue grama	25	5
June grass	10	5
Wheatgrasses	20	20
Sandberg's bluegrass	10	–
Plains reedgrass	5	5
Sedges	10	–
Cactus	5	5
Fringed sage	5	–
	100	50

corded is entered in the **Original or Climax** column. Blue grama is an increaser, hence the estimate of 25 percent shows an increase of 20 percent over the maximum of 5 percent found in the original or climax vegetation. Only the 5 percent is tallied in the **Climax** column in the table above. June grass, also an increaser, shows an estimate of 10 percent, which is 5 percent over the maximum of 5 percent normally found in the original or climax vegetation. Again only 5 percent is entered in the **Climax** column. The wheatgrasses behave as decreasers on this range site and any amount present is part of the original vegetation – the 20 percent recorded is entered in the **Climax** column. Sandberg's bluegrass is an increaser that is not present in the original vegetation and the 10 percent recorded is not entered in the **Climax** column. Plains reedgrass, an increaser, shows no increase on this site. The 5 percent recorded is not abnormal for the site and is entered in the **Climax** column. Sedges, also increasers, are not present in the climax and the 10 percent recorded is not entered in the **Climax** column. Cactus is considered to be a **Forb increaser** of which 5 percent composes the original vegetation. The 5 percent recorded is entered in the **Climax** column. Fringed sage is not found in recognizable amounts in the climax vegetation on this site and the 5 percent recorded is not entered in the **Climax** column.

The **Climax** figures, added together, total 50 percent. This means that, of the vegetation present on this site, 50 percent is original or climax for the site. The range condition rating would be in the **Fair** condition class (from the tabulation on page 10).

According to the Stocking Rate Table for Normal Soils (Table 1), the stocking rate would be 0.20 AUM per acre. Thus, 1,000 acres would provide 200 AUMs of grazing. If the pasture were to be stocked for 4 months, 50 mature

cattle would be recommended, or for 10 months, 20 cattle. A grazing inventory form (Appendix II) has been designed to record information of a range site.

ANIMAL UNIT EQUIVALENTS

The **animal unit** is the standard used in calculating the relative grazing impact of different kinds and classes of livestock and grazing wildlife. Animal unit equivalents for the various classes of livestock and wildlife are:

Cattle:	
Weaned calves	0.50
Yearling heifers and steers	0.67
Mature cows with or without unweaned calves at side	1.00
Bulls, 2 years and over	1.50
Horses:	
Yearlings	0.75
Two-year-olds	1.00
Three-year-olds and over	1.50
Sheep and goats:	
5 weaned lambs, kids and yearlings to 12 months	0.50
5 ewes or does, with or without unweaned lambs or kids	1.00
5 rams or bucks	1.30
Deer:	
5 deer	1.00
Bison:	
Yearling	0.75
Mature cow	1.50
Mature bull	1.80

Where the need is apparent, these equivalents may be adjusted as warranted by dependable local data. The animal unit may be adjusted to account for differences in size; for example, a 1,250 lb. cow should represent a 1.25 animal unit. Also, the need to use different animal unit equivalents may arise because the forage that is available may not be equally usable by the different kinds of animals. Moreover, different kinds of animals may use importantly different areas or forage species within some pastures.

Recommended stocking rates are given in several ways: for example, as animal unit months per acre, acres per animal unit month, and acres per animal unit for 6 or 12 months. The relation among these various concepts is shown in Table 3.

STOCKING RATES ON SEEDED PASTURES

The principles used in determining condition of rangeland do not apply to pastures seeded to introduced grasses and legumes. However, seeded pastures are very productive especially when grazed in spring to defer the use of native range, or in the fall as they take the pressure off rangeland thus allowing for an improvement in the condition of native range. As most ranches use seeded pastures to complement native range, these seeded pastures must be considered when the carrying capacity of the ranch as a whole is estimated. Suggested stocking rates for some of the species used in seeded pastures in the various precipitation zones are shown in Table 4.

Stocking rates have been determined for the various condition classes of seeded and irrigated pastures. These stocking rates may be used as a guideline, depending on the

TABLE 3. Conversions from AUM per acre

AUM per acre	Acres per AUM	Acres for 6 months	Acres for 12 months
0.05	20.0	120.0	240
0.10	10.0	60.0	120
0.15	6.7	40.0	80
0.20	5.0	30.0	60
0.25	4.0	24.0	48
0.30	3.3	20.0	40
0.35	2.9	17.0	34
0.40	2.5	15.0	30
0.45	2.2	13.0	26
0.50	2.0	12.0	24
0.60	1.7	10.0	20
0.75	1.3	8.0	16
0.80	1.2	7.0	15
0.90	1.1	6.6	13
1.00	1.0	6.0	12
1.25	0.8	4.8	10
1.50	0.7	4.0	8
2.00	0.5	3.0	6

TABLE 4. Suggested stocking rates (AUM/acre) for some of the introduced grasses

	Precipitation zone (inches)		
Pasture	10 to 14	14 to 18	18 to 22
Crested wheatgrass	0.67	1.00	–
Russian wildrye	0.50	0.75	–
Pubescent wheatgrass	0.75	1.25	–
Kentucky bluegrass	–	0.75	1.00
Timothy	–	1.25	1.75
Intermediate wheatgrass	–	1.25	1.75
Brome	–	1.00	1.50
Orchard grass	–	1.25	1.75

species in the mixture, age of stand, pattern of seeding, use of fertilizers, presence of legume, amount of water available, kind of soil, absence of weeds or brush, and past grazing and management.

Criteria used to rate seeded pastures have been developed. They are based on potential yield and the amount of desirable and undesirable species present in the stand as shown below.

Seeded Pasture Condition Classes

Condition	Criteria
Excellent	1. 75-100% of the potential yield for the area. 2. 95% of the production coming from desirable species. 3. 25-50% of the production coming from a desirable legume in the mixture. 4. Less than 5% of the total production coming from weeds or undesirable plants.
Good	1. 50-75% of the potential yield for the area. 2. 75% of the production coming from desirable species. 3. Less than 25% legume in the mixture. 4. Less than 10% of the production coming from weeds or undesirable plants.
Fair	1. 25-50% of the potential yield for the area. 2. 60% of the production coming from desirable species. 3. Less than 10% legume in the mixture.

4. 25% or more of the total production coming from weeds or undesirable plants.

Poor

1. 0-25% of the potential yield for the area.
2. Less than 50% of the production coming from desirable species.
3. 50% or more of the total production coming from weeds or undesirable plants.
4. Should be cultivated and reseeded to desirable grasses and legumes.

The stocking rates for seeded and irrigated pasture in the various precipitation zones based on pasture condition are shown in Table 5.

TABLE 5. Stocking rates for seeded and irrigated pasture at various condition classes

Average annual precipitation zone (inches)	Stocking rates for various pasture condition classes (AUM/acre)			
	Excellent	Good	Fair	Poor
Irrigation	7.50	5.00	3.75	2.50
22 - 26	5.00	3.35	2.50	1.65
18 - 22	2.00	1.40	1.00	0.70
14 - 18	1.25	0.80	0.60	0.40
10 - 14	0.75	0.50	0.40	0.25

COMMON AND BOTANICAL NAMES OF PLANTS MENTIONED

Grasses

Awned wheatgrass	*Agropyron subsecundum*
Beardless wheatgrass	*Agropyron inerme*
Bluebunch wheatgrass	*Agropyron spicatum*
Blue grama	*Bouteloua gracilis*
Brome	*Bromus inermis*
Canada wildrye	*Elymus canadensis*
Cheatgrass	*Bromus tectorum*
Columbia needle grass	*Stipa columbiana*
Crested wheatgrass	*Agropyron cristatum*
Foxtail barley	*Hordeum jubatum*
Fringed brome grass	*Bromus ciliatus*
Giant wildrye	*Elymus cinereus*
Green needle grass	*Stipa viridula*
Hairy wildrye	*Elymus innovatus*
Hooker's oatgrass	*Helictotrichon hookeri*
Idaho fescue	*Festuca idahoensis*
Indian rice grass	*Oryzopsis hymenoides*
Intermediate oatgrass	*Danthonia intermedia*
Intermediate wheatgrass	*Agropyron intermedium*
June grass	*Koeleria cristata*
Kentucky bluegrass	*Poa pratensis*
Little bluestem	*Andropogon scoparius*
Mat muhly	*Muhlenbergia richardsonis*
Needle-and-thread	*Stipa comata*
Northern awnless brome	*Bromus pumpellianus*
Northern wheatgrass	*Agropyron dasystachyum*
Nuttall alkali grass	*Puccinellia nuttalliana*
Orchard grass	*Dactylis glomerata*
Parry oatgrass	*Danthonia parryi*

Plains muhly	*Muhlenbergia cuspidata*
Plains reed grass	*Calamagrostis montanensis*
Pubescent wheatgrass	*Agropyron trichophorum*
Richardson needle grass	*Stipa richardsonii*
Rough fescue	*Festuca scabrella*
Russian wildrye	*Elymus junceus*
Saltgrass	*Distichlis stricta*
Sandberg's bluegrass	*Poa secunda*
Sand dropseed	*Sporobolus cryptandrus*
Sand grass	*Calamovilfa longifolia*
Sheep fescue	*Festuca ovina*
Slender wheatgrass	*Agropyron trachycaulum*
Ticklegrass	*Agrostis scabra*
Timothy	*Phleum pratense*
Tufted hairgrass	*Deschampsia caespitosa*
Western porcupine grass	*Stipa spartea* var. *curtiseta*
Western wheatgrass	*Agropyron smithii*

Sedges and Rushes

Awned sedge	*Carex atherodes*
Baltic rush	*Juncus balticus*
Low sedge	*Carex eleocharis*
Sun-loving sedge	*Carex heliophila*
Thread-leaved sedge	*Carex filifolia*

Forbs and Shrubs

Broomweed	*Gutierrezia diversifolia*
Cactus	*Opuntia* spp.
Canada thistle	*Cirsium arvense*
Dandelion	*Taraxacum officinale*
Fringed sage	*Artemisia frigida*
Goatsbeard	*Tragopogon dubius*
Goosefoot's	*Chenopodium* spp.

Greasewood	*Sarcobatus vermiculatus*
Gumweed	*Grindelia squarrosa*
Hedysarum	*Hedysarum* spp.
Leafy surge	*Euphorbia esula*
Lupine	*Lupinus* spp.
Nuttall's saltsage	*Atriplex nuttallii*
Peppergrass	*Lepidium densiflorum*
Russian thistle	*Salsoli kali*
Sagebrush	*Artemisia cana*
Shrubby cinquefoil	*Potentilla fruticosa*
Toadflax	*Linaria vulgaris*
Tumbleweed	*Amaranthus albus*
Vetches	*Vicia* spp.
Western snowberry	*Symphoricarpos occidentalis*
Winterfat	*Eurotia lanata*

APPENDIX I

Alberta Guide Tables Showing Response to Grazing by Cattle of Key Species (Decreasers, Increasers, and Invaders) and Their Ecological Position in the Climax Community of Range Sites

PART I: 6- TO 10-INCH PRECIPITATION ZONE

		Maximum percent dry weight produced annually in climax by range sites*												
DECREASERS	INCREASERS	WL	Sb	Ov	SL	Se	Sy	Lo	Cy	SwG	BIO	TB	Gr	SU	BdL	INVADERS
Needle-and-thread	Blue grama	–	–	5	–	5	5	10	5	5	5	–	5	–	–	Cheatgrass
Western porcupine grass	Sandberg's bluegrass	–	–	–	–	5	5	5	5	5	5	5	10	10	10	Foxtail barley
Green needlegrass	June grass	–	–	–	–	5	5	5	5	10	10	10	10	–	10	Russian thistle
Slender wheatgrass	Plains reed grass	–	–	5	–	5	5	–	10	10	10	10	10	–	10	Gumweed
Western wheatgrass	Sand grass	–	–	–	–	10	5	–	–	–	–	–	–	–	–	Broomweed
Tufted hairgrass	Plains muhly	–	–	–	–	–	–	–	–	5	–	5	5	5	5	Dandelion
Northern wheatgrass	Mat muhly	–	–	5	10	–	–	–	–	5	–	–	–	5	–	Goosefoots
Indian ricegrass	Saltgrass	–	5	–	10	–	–	–	–	–	–	–	–	5	–	Goldenbeard
Sand dropseed	Sedge increasers	20	15	5	5	5	5	5	10	5	10	5	5	–	5	Tumbleweed
Nuttall alkali grass	Baltic rush	–	–	–	10	–	–	–	–	–	–	–	–	–	–	Canada thistle
Thread-leaved sedge	Western snowberry	–	10	5	–	–	–	–	–	–	–	–	–	–	–	All other annuals
Tall sedges	Fringed sage	–	5	–	5	5	5	–	–	5	5	5	5	–	–	All other biennials
Winterfat	Sagebrush	–	5	5	–	–	–	5	–	–	–	5	–	–	–	All other exotics
Nuttall saltsage	Greasewood	–	–	–	10	–	–	–	–	–	–	5	–	5	10	
Forb decreasers	Woody increasers	10	10	10	5	5	–	–	–	–	–	–	–	–	–	
Woody decreasers	Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5	5	5	

* The symbol – means that the species has less than 2.5% coverage or is not present in the climax vegetation for this site. The symbol 0 means that the species is a decreaser on this site. Range soil groups are described as follows: WL - WET LANDS; Sb - SUBIRRIGATED; Ov - OVERFLOW; SL - SALINE LOWLAND; Se - SANDS; Sy - SANDY; Lo - LOAMY; Cy - CLAYEY; SwG - SHALLOW TO GRAVEL; BIO - BADLANDS; TB - THIN BREAKS; Gr - GRAVEL; SU - SALINE UPLAND; BdL - BADLANDS

PART II: 10- TO 14-INCH PRECIPITATION ZONE

DECREASERS	INCREASERS	Maximum percent dry weight produced annually in climax by range sites*															INVADERS
		WL	Sb	Ov	SL	Sa	Sy	Lo	Cy	CS	SwG	BIO	TB	Gr	SU	BdL	
Rough fescue	Needle-and-thread	–	–	10	–	30	d	d	15	d	d	d	d	d	–	d	Cheatgrass
Western porcupine grass	Blue grama	–	–	5	–	–	5	5	5	–	5	5	–	5	–	–	Foxtail barley
Green needlegrass	Sandberg's bluegrass	–	–	–	–	–	–	–	5	–	5	5	5	10	d	d	Kentucky bluegrass
Slender wheatgrass	Tufe grass	–	–	–	–	5	5	5	5	5	10	10	10	d	–	d	Timothy
Awned wheatgrass	Plains reedgrass	–	–	–	5	–	5	5	–	–	10	10	10	10	d	d	Gumweed
Wildryes	Sand grass	–	–	–	–	10	5	–	–	10	–	–	–	–	–	–	Dandelion
Tufted hairgrass	Wheatgrasses	–	25	45	35	5	d	d	d	d	d	d	d	d	d	d	Goosefoot s
Indian ricegrass	Plains muhly	–	–	–	–	–	–	–	–	–	–	–	5	5	5	5	Goatsbeard
Sand dropseed	Mat muhly	–	–	5	10	–	–	–	–	–	–	–	–	–	5	–	Russian thistle
Nuttall alkali grass	Salt grass	–	5	–	10	–	–	–	–	–	–	–	–	–	d	–	Broomweed
Bluebunch wheatgrass[1]	Sedge increasers	20	15	5	5	5	5	–	5	5	10	5	10	d	–	d	Canada thistle
Thread-leaved sedge	Baltic rush	–	–	–	10	–	–	–	–	–	–	–	–	–	–	–	Leafy spurge
Tall sedges	Western snowberry	–	10	5	–	–	–	–	–	–	–	–	–	–	–	–	All other annuals
Winterfat	Fringed sage	–	–	–	–	5	–	–	–	5	–	5	–	5	–	–	All other biennials
Nuttall saltsage	Sagebrush	–	5	5	–	–	–	–	5	–	–	–	–	–	–	–	All other exotics
Forb decreasers	Greasewood	–	–	–	10	–	–	–	–	–	–	–	5	–	5	d	
Woody decreasers	Woody increasers	15	15	15	5	10	5	–	–	15	–	–	–	–	–	–	
	Forb increasers	–	–	–	–	–	–	5	–	10	–	–	5	5	–	5	

* The symbol – means that the species has less than 2.5% coverage or is not present in the climax vegetation for this site. The symbol d means that the species is a decreaser on this site. Range soil groups are described as follows: WL - WET LANDS; Sb - SUBIRRIGATED; Ov - OVERFLOW; SL - SALINE LOWLAND; Sa - SANDS; Sy - SANDY; Lo - LOAMY; Cy - CLAYEY; CS - CHOPPY SANDHILLS; SwG - SHALLOW TO GRAVEL; BIO - BLOWOUTS; TB - THIN BREAKS; Gr - GRAVEL; SU - SALINE UPLAND; BdL - BADLANDS

PART III: 14- TO 18-INCH PRECIPITATION ZONE

DECREASERS	INCREASERS	Maximum percent dry weight produced annually in climax by range sites*																INVADERS
		WL	Sb	Ov	SL	Sa	Sy	Lo	Cy	CS	SwG	Li	BlO	TB	Gr	SU	BdL	
Rough fescue	Needle-and-thread	–	–	5	–	20	15	10	10	15	15	5	15	d	d	–	d	Cheatgrass
Western porcupine grass	Blue grama	–	–	–	–	–	–	–	5	5	5	–	5	5	5	–	15	Foxtail barley
Green needlegrass	Sandberg's bluegrass	–	–	–	–	–	–	–	5	–	10	10	10	10	10	10	10	Kentucky bluegrass
Slender wheatgrass	June grass	–	–	–	–	–	–	5	5	10	10	10	10	10	10	–	10	Timothy
Awned wheatgrass	Plains reedgrass	–	–	–	–	–	–	–	10	–	–	10	15	d	5	–	10	Gumweed
Wildryes	Idaho fescue	–	–	–	–	–	5	5	5	–	5	5	–	d	d	–	–	Dandelion
Tufted hairgrass	Wheatgrasses	–	15	30	d	15	d	25	30	d	d	d	d	d	d	d	d	Goosefoots
Indian ricegrass	Plains muhly	–	–	–	–	–	5	–	–	–	5	5	–	5	5	5	5	Goatsbeard
Sand dropseed	Mat muhly	–	5	5	10	–	–	–	–	–	–	–	–	–	–	5	–	Russian thistle
Nuttall alkali grass	Sand grass	–	–	–	–	10	–	–	–	10	–	5	–	d	–	–	d	Broomweed
Bluebunch wheatgrass	Little bluestem	–	–	–	–	–	–	–	–	–	5	5	–	–	–	–	–	Canada thistle
Hooker's oatgrass	Sedge increasers	25	15	5	5	–	5	–	–	5	5	5	5	10	–	–	–	Leafy spurge
Sheep fescue	Western snowberry	–	–	–	–	5	–	–	5	–	5	–	–	–	–	–	5	All other annuals
Winterfat	Fringed sage	–	–	–	–	–	5	5	5	–	–	5	–	5	5	–	5	All other biennials
Nuttall saltsage	Sagebrush	–	–	5	5	–	5	5	–	–	–	–	–	5	–	–	5	All other exotics
Forb decreasers	Greasewood	–	–	–	10	–	–	–	–	–	–	–	–	–	–	5	5	
Woody decreasers	Woody increasers	10	–	–	–	10	5	–	5	10	–	5	–	–	–	–	5	
	Forb increasers	10	–	–	–	–	–	–	5	5	–	5	–	5	–	5	5	

* The symbol – means that the species has less than 2.5% coverage or is not present in the climax vegetation for this site. The symbol d means that the species is a decreaser on this site. Range soil groups are described as follows: WL - WET LANDS; Sb - SUBIRRIGATED; Ov - OVERFLOW; SL - SALINE LOWLAND; Sa - SANDS; Sy - SANDY; Lo - LOAMY; Cy - CLAYEY; CS - CHOPPY SANDHILLS; SwG - SHALLOW TO GRAVEL; Li - LIMY; BlO - BLOWOUTS; TB - THIN BREAKS; Gr - GRAVEL; SU - SALINE UPLAND; BdL - BADLANDS

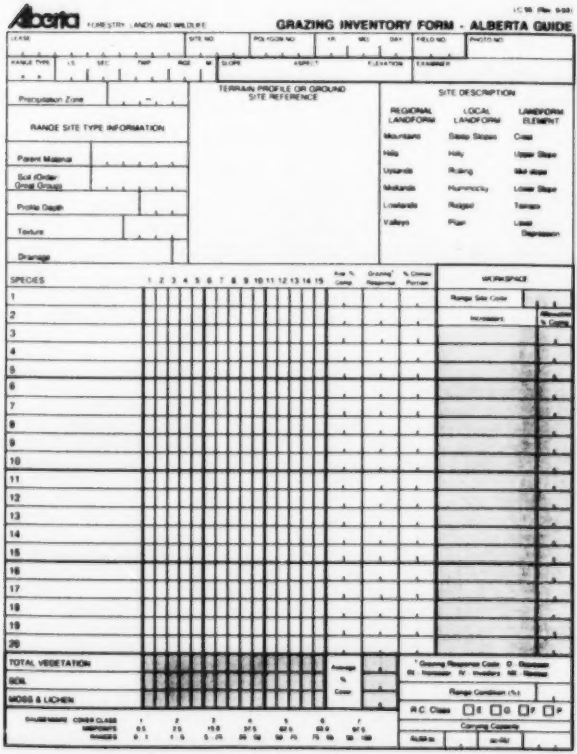
PART IV: 18- TO 22-INCH PRECIPITATION ZONE

DECREASERS	INCREASERS	Maximum percent dry weight produced annually in climax by range sites*													INVADERS
		WL	Sb	Ov	SL	Sa	Sv	Sy	Lo	Cy	SwG	Li	TB	Gr	
Rough fescue	Western porcupine grass	–	–	–	–	d	d	5	5	5	–	5	–	–	Cheatgrass
Columbia needlegrass	Parry oatgrass	–	–	–	–	15	–	15	20	20	10	10	d	d	Foxtail barley
Green needlegrass	Idaho fescue	–	–	–	–	–	–	5	5	5	5	–	d	d	Tickle grass
Richardson needlegrass	Intermediate oatgrass	–	–	–	–	–	–	10	10	10	15	10	5	5	Kentucky bluegrass
Slender wheatgrass	June grass	–	–	–	–	–	5	–	–	5	5	5	10	10	Timothy
Canada wildrye	Tufted hairgrass	20	20	10	10	d	d	d	–	–	–	–	–	–	Canada thistle
Indian ricegrass	Wheatgrasses	–	10	25	10	5	5	5	5	5	d	d	d	d	Dandelion
Mountain brome	Plains muhly	–	–	–	–	–	–	–	–	–	5	5	5	5	Leafy spurge
Northern awnless brome	Saltgrass	–	–	–	10	–	–	–	–	–	–	–	–	–	Toadflax
Bluebunch wheatgrass	Sedge increasers	20	5	5	5	5	5	5	–	5	5	5	–	–	
Hooker's oatgrass	Shrubby cinquefoil	–	–	–	–	5	5	–	–	–	10	–	5	10	All other annuals
Vetches	Lupine	–	–	–	–	5	–	5	5	–	–	–	–	–	All other biennials
Hedysarum	Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5	5	All other exotics
Forb decreasers	Woody increasers	15	10	10	10	10	10	5	5	5	5	5	5	5	
Woody decreasers	Conifers	–	–	–	–	–	15	–	–	–	–	–	5	10	

* The symbol – means that the species has less than 2 5% coverage or is not present in the climax vegetation for this site The symbol d means that the species is a decreaser on this site Range soil groups are described as follows WL - WET LANDS Sb - SUBIRRIGATED Ov - OVERFLOW SL - SALINE LOWLAND Sa - SANDS Sv - SAVANNAH Sy - SANDY Lo - LOAMY Cy - CLAYEY SwG - SHALLOW TO GRAVEL Li - LIMY TB - THIN BREAKS Gr - GRAVEL

APPENDIX II

Copies of the form may be obtained from Alberta Public Lands, Sun Centre, 530 - 8th Street South, Lethbridge, Alberta, T1J 2J8; or from Forestry, Lands and Wildlife, Information Centre, Main Floor, 9920 - 108th Street, Edmonton, Alberta, T5K 2M4.



FC 55 (Rev. 9/86)

ORIGINAL ACTIVITY CLASS (Check one) ☐ U ☐ L ☐ M ☐ H	CURRENT UTILIZATION ____ %	COMMENTS
RANGE CONDITION CLASS ☐ E ☐ G ☐ F ☐ P	SERVICE LOADS HEIGHT ____ DENSITY ____	
RANGE USE CATEGORY ☐ Primary ☐ Secondary ☐ Non Use		
HEIGHT CLASS DISTRIBUTION (Circle one) 91 • 0 - 0.5 92 • 0.5 - 1 93 • 1 - 3 94 • 3 - 6		

CLASS DENSITY DISTRIBUTION		SPECIES	DENSITY (No./sq. ft.)	MEAN HEIGHT (ft)	HEIGHT RANGE	% AREA COVER	DBH FOR PALATABLE
1 Rare individual or single occurrence	•	1		•	• - •		
2 A few sporadically occurring individuals	• •						
3 A single patch or clump of a species		2		•	• - •		
4 Several sporadically occurring individuals		3		•	• - •		
5 A few patches or clumps of a species		4		•	• - •		
6 Several well spaced patches or clumps		5		•	• - •		
7 Continuous uniform occurrence of well spaced individuals		6		•	• - •		
8 Continuous occurrence of a species with a few gaps in the distribution		7		•	• - •		
9 Continuous dense occurrence of a species		8		•	• - •		

POISONOUS PLANTS — LOCATION — FREQUENCY

SPECIES				
1				
2				
3				

WEEDS — D - Dense M - Moderate S - Scattered R - Rare

SPECIES	D	M	S	R
1				
2				
3				

RANGE IMPROVEMENT SITE POTENTIAL

WATER SOURCE

Location _____ ☐ Required ☐ Not Required Distance _____ km

☐ creek ☐ dugout ☐ trough ☐ slough ☐ spring/pond ☐ other (specify) _____

Water Quality/Access (specify)

ACCESS (CATTLE)

☐ G ☐ F ☐ P ☐ truck trail ☐ road ☐ seismic ☐ game trail ☐ valley bottom ☐ other (specify)

COMMENTS: CONSTRAINTS/RECOMMENDATIONS FOR WILDLIFE USE, RECREATION OR COMMERCIAL USE	PHOTOS TAKEN